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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/588,283	07/23/2007	Masashi Kawasaki	S8810.0003/P003	5019

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EXAMINER	
HORNING, JOEL G	

ART UNIT	PAPER NUMBER
1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/588,283	KAWASAKI ET AL.	
	Examiner	Art Unit	
	JOEL G. HORNING	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,21 and 22* is/are pending in the application.

4a) Of the above claim(s) *10,11 and 22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. In the response of November 19th, 2009, applicant has: amended claims 1-4, 6, 7 and 9. Claims 1-11, 21 and 22 are currently pending.

Election/Restrictions

2. **Claims 10, 11 and 22** are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on April 30th, 2009.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 1-9 and 21** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. **Claims 1, 3 and 6** have each been amended to recite "a total duration of the first doped layer growing step and the second doped layer growing step is at least 100 seconds." The examiner can find no support in applicant's specification for this range of greater

than or equal to 100 seconds for the total duration of the first and second layer growing steps.

4. **Claims 2, 4, 5, 7-9 and 21** are rejected for being dependent upon these rejected claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining , obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. **Claims 1-4 and 6-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishizaki (WO02/089223, as literally translated in US 6939731).

Ishizaki teaches a process of forming doped thin film by growing a thin film of in the presence of a dopant gas, interrupting the supply of the metal precursor, so that film growth is stopped, annealing the film by heating it to a higher temperature (at least a hundred degrees Celsius higher), then cooling down the substrate to the

growth temperature again, starting growth by flowing the precursor gases again and repeating the growth and anneal steps (col 18, lines 14-24,50-67).

Ishizaki teaches a first temperature of about 300-400°C (col 17, lines 16-24) and the high temperature annealing takes place between 100 °C more than the first temperature to less than the melting temperature of the oxide (col 18, lines 63-65). Additionally, Ishizaki later teaches annealing zinc oxide films at 800°C (col 21, lines 6-7), so it is a temperature below the melting temperature of the oxide. MPEP 2144.05 states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists" **(claim 8).**

Ishizaki further teaches that the duration of the doped layer growing step is controlled in order to produce a desired number of monolayers absorbed onto the substrate. Increasing the duration improves the efficiency of the fabrication, while decreasing the duration allows the annealing step to be decreased (col 19, lines 19-38). Thus the duration of the growing step is a result effective variable that is modified in order to control the thickness of the layer that is produced by that step.

Thus it would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed ranges of: a "total duration of the doped layer growing step is at least 100 seconds" through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980) **(claim 3)**.

6. Regarding **claim 1,** Ishizaki teaches that the precursor gases can be abruptly cut off for the duration of the annealing step (which would avoid film growth during the annealing step) (figure 8A), but it also teaches that instead of a sharp transition at the start of the annealing step, during the annealing step, the precursor gases can be gradually decreased until they reach zero flow (growth interruption) then gradually increased (figure 8D) (col 20, lines 13-17). The annealing temperature is maintained for between 5-15 seconds (col 19, line 65 through col 20, line 3). Thus, after the deposition is cut off (gas flow to zero), at the elevated annealing temperature, the gas flow is reinstated during the annealing step. Since the precursor gases are present at the elevated temperature, they will react to form a film at the elevated second temperature.

   Since, as discussed above, the duration of the deposition step is known as result effective, it would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed ranges of: “a total duration of the first doped layer growing step and the second doped layer growing step is at least 100 seconds” through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980) **(claim 1)**.

7. Regarding **claim 6,** Ishizaki further teaches that their film is a zinc oxide thin film (in order to avoid confusion, the examiner notes that "a" can be zero, so p-type doped

ZnO without any magnesium is taught, col 7, lines 56) that has particularly preferably been doped with nitrogen to render it p-type (col 12, lines 16-21) **(claim 6)**.

8. Regarding **claims 2, 4 and 7**, as discussed previously, Ishizaki teaches repeating the process (col 18, lines 50-55).

9. **Claims 5, 9 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishizaki in view of Koinuma et al (US 6617539).

Ishizaki teaches heating the substrates using a "heating source," such as an infrared lamp (col 24, lines 47-58), but it does not teach using a laser beam for this purpose.

However, Koinuma et al is also directed towards methods for forming thin films in reactors which require heating (abstract). It teaches using a laser beam to heat the film deposition substrate is an effective method for heating the substrate in a very short period of time and is well suited for films that are to be deposited in oxidizing atmospheres (col 1, line 57 through col 2, line 2).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use a laser beam instead of the light from a lamp in order to heat the substrate since it was also known to be suitable for film deposition in oxidizing atmospheres and would be able to heat the substrate in a very short period of time and the substitution would lead to predictable results **(claims 5, 9 and 21)**.

Response to Arguments

10. Applicant's arguments with respect to claims 1-9 and 21 have been considered but are not convincing in view of the new ground(s) of rejection necessitated by amendment.

11. Applicant argues that it is not certain whether the national stage entry of Ishizaki et al is a literal translation of its parent PCT application, so the rejection was improper and should not be made final. The applicant has cited MPEP 706.02 (II) to evidence this. The examiner disagrees. This section is directed to how the English language abstracts that are often associated with foreign language patent documents can be used in an office action, not to English language US national stage entry applications of the PCT application. According to MPEP 1893.01 (d): "Applicants entering the national stage in the U.S. are required to file an English translation of the international application if the international application was filed in another language and was not published under PCT Article 21(2) in English." Thus, the national stage application is actually required to be a *literal translation* of the PCT application, so in providing and citing US 6939731, the examiner had provided and was properly citing a literal translation of the specification of the previously published WO02/089223.

12. Regarding applicant's argument that Ishizaki does not teach what the total duration of the doped layer growing step is, as cited in the application above, it teaches controlling the duration of the doped layer growing steps in order to produce the desired thickness for that layer, so it is obvious to optimize the duration of the growing step to be within applicant's claimed range.

13. Regarding applicant's argument that Tsukazaki is not prior art, applicant is correct. However, according to MPEP 2124: "[i]n certain circumstances, references cited to show a universal fact need not be available as prior art before applicant's filing date. In re Wilson, 311 F.2d 266, 135 USPQ 442 (CCPA 1962). Such facts include the characteristics and properties of a material or a scientific truism." Tsukazaki was only evidenced the demonstrate that the properties of the material that is produced by the process of Ishizaki would read upon applicant's claims, so it does not need to be prior art.

Conclusion

14. No current claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792